

ABSTRACT OF THE DISCLOSURE

- 5 The present invention includes the receptor protein 4-1BB and the cDNA gene encoding for receptor protein 4-1BB. The nucleotide sequence of the isolated cDNA is disclosed herein along with the deduced amino acid sequence. The 4-1BB protein and fragments and derivatives can be used: 1) as a probe to isolate ligands to receptor protein 4-1BB, 2) to stimulate proliferation of B-cell's expressing 4-1BB, or
- 10 3) to block 4-1BB ligand binding. A monoclonal antibody against 4-1BB was developed which specifically recognizes an epitope on the extracellular domain of receptor protein 4-1BB. The monoclonal antibody can be used enhance T-cell proliferation and activation by treating T-cells that have expressed receptor protein 4-1BB with the monoclonal antibody. The effectiveness of the treatment was
- 15 enhanced when conducted in the presence of protein tyrosinase kinase. A fusion protein for detecting cell membrane ligands to receptor protein 4-1BB was developed. It comprises the extracellular portion of the receptor protein 4-1BB and a detection protein bound to the portion of the receptor protein 4-1BB.